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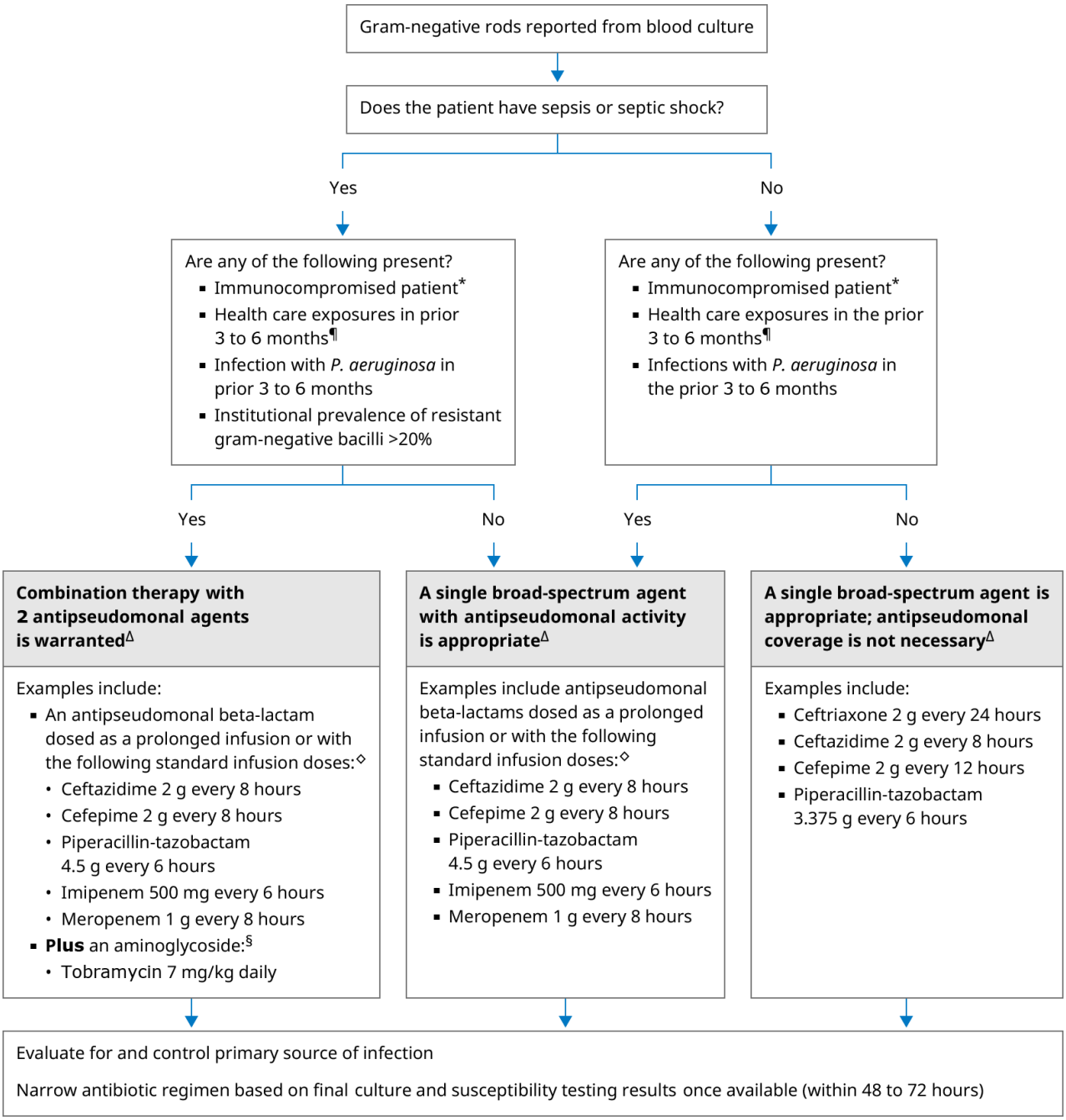
# Algorithm for empiric antimicrobial selection for gram-negative bacillary bacteremia


Gram-negative rods reported from blood culture
Does the patient have sepsis or septic shock?
Yes
No
Are any of the following present?
Immunocompromised patient*
Health care exposures in prior 3 to 6 months¶
Infection with P. aeruginosa in prior 3 to 6 months
Institutional prevalence of resistant gram-negative bacilli >20%
Are any of the following present?
Immunocompromised patient*
Health care exposures in the prior 3 to 6 months¶
Infections with P. aeruginosa in the prior 3 to 6 months
Yes
No
Yes
No
Combination therapy with 2 antipseudomonal agents is warranted△
Examples include:
An antipseudomonal beta-lactam dosed as a prolonged infusion or with the following standard infusion doses:◇
Ceftazidime 2 g every 8 hours
Cefepime 2 g every 8 hours
Piperacillin-tazobactam 4.5 g every 6 hours
Imipenem 500 mg every 6 hours
Meropenem 1 g every 8 hours
Plus an aminoglycoside:§
Tobramycin 7 mg/kg daily
A single broad-spectrum agent with antipseudomonal activity is appropriate△
Examples include antipseudomonal beta-lactams dosed as a prolonged infusion or with the following standard infusion doses:◇
Ceftazidime 2 g every 8 hours
Cefepime 2 g every 8 hours
Piperacillin-tazobactam 4.5 g every 6 hours
Imipenem 500 mg every 6 hours
Meropenem 1 g every 8 hours
A single broad-spectrum agent is appropriate; antipseudomonal coverage is not necessary△
Examples include:
Ceftriaxone 2 g every 24 hours
Ceftazidime 2 g every 8 hours
Cefepime 2 g every 12 hours
Piperacillin-tazobactam 3.375 g every 6 hours
Evaluate for and control primary source of infection
Narrow antibiotic regimen based on final culture and susceptibility testing results once available (within 48 to 72 hours)

This algorithm reflects a general approach to the empiric selection of antibiotic therapy for gram-negative bacillary bacteremia. Patients with a history of infection with extremely drug-resistant organisms (such as carbapenem-resistant Enterobacteriaceae) warrant additional consideration and consultation with an expert ir infectious diseases. Listed doses are for parenteral administration in adults with normal renal function.

ESBL: extended-spectrum beta-lactamases.

* Immunocompromising conditions include: poorly controlled diabetes mellitus, chronic high-dose corticosteroid use, use of other immunosuppressive agents, neutropenia, advanced HIV infection, B or T leukocyte deficiency.

¶ Health care exposures include: hospitalization, hemodialysis, residence in a long-term care facility, and intravenous antibiotic use or chemotherapy.

Δ Empiric therapy should be further tailored based on additional history, prior history of multidrug-resistant gram-negative pathogens, and likely source of infection. As an example, a carbapenem (imipenem or meropenem) is preferable for a patient with a history of infection with ESBL-producing organisms within the prior 6 months. Alternatively, for a patient with gram-negative bacteremia in the setting of cholangitis, a beta-lactam/beta-lactamase inhibitor or a carbapenem may be preferable to provide anaerobic coverage. For patients with sepsis or septic shock, broad-spectrum gram-positive coverage is often also used until cultures have been finalized. Drug dose lists are for adult patients with normal renal function. Refer to other UpToDate content for options for patients with severe beta-lactam allergies.

◇ For patients with gram-negative bacillary bacteremia and septic shock, we favor a prolonged infusion dosing strategy for most beta-lactams. Refer to other UpToDate content on prolonged infusions of beta-lactam antibiotics.

§ When there is a risk, we favor tobramycin over gentamicin or amikacin because tobramycin has greater intrinsic in vitro activity. Tobramycin dosing depends on the patient's weight and creatinine clearance. Dosing adjustments should be based on the results of serum drug concentration monitoring. Refer to other UpToDate content on aminoglycoside dosing.

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